

Food or commodity? Indicators of food self-sufficiency in Agribusiness territories, Mato Grosso, Brazil

Alimento ou mercadoria? Indicadores de autossuficiência alimentar em territórios do agronegócio, Mato Grosso, Brasil

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ABSTRACT The land use for the production of agricultural commodities in municipalities of the agribusiness in Mato Grosso state has been occupying space for food production. The objective of this study was to present and discuss a composite indicator of self-sufficiency assessment in the production of food in interface with the implications of the agribusiness productive model, in the perspective of the food sovereignty of the territories, based on a case study carried out in the counties Campos de Júlio, Sapezal and Campo Novo dos Parecis. Socioeconomic data were collected based on the IBGE/2010 Demographic Census, Profile of Brazilian States and Municipalities/IBGE (Brazilian Institute of Geography and Statistics), 2014, and the Agricultural Census of 2006. For production survey, data available in the IBGE System of Automatic Recovery (Sidra) were used for the year of 2016. Informations were obtained on the cultivated area of cotton, rice, banana, coffee, sugarcane, citrus, beans, sunflower, corn, soybean, tomato. Interviews were conducted with rural workers and horticulturists. Based on the data, composite indicators were developed for proposing a food self-sufficiency scale in the territories studied. The results point to inequities in the occupation of the territories, dependence on food from other regions and increased use of pesticides as a consequence of the adopted production model, affecting local food production.

KEYWORDS Food production. Food supply. Environmental health.

RESUMO O uso da terra para produção de commodities agrícolas em municípios do agronegócio mato-grossense vem ocupando espaço de produção de alimentos. O objetivo deste estudo foi apresentar e discutir um indicador composto de avaliação da autossuficiência na produção de alimentos em interface com as implicações do modelo produtivo do agronegócio, na perspectiva da soberania alimentar dos territórios, baseado no estudo de caso realizado nos municípios de Campos de Júlio, Sapezal e Campo Novo dos Parecis. Os dados socioeconômicos foram levantados a partir do Censo Demográfico do Instituto Brasileiro de Geografia e Estatística – IBGE/2010, Perfil dos Estados e dos Municípios Brasileiros/IBGE, 2014, e Censo Agropecuário de 2006. Para levantamento de produção, utilizaram-se dados disponíveis no Sistema IBGE de Recuperação Automática (Sidra) para o ano de 2016. Obtiveram-se informações acerca de área plantada das culturas de algodão, arroz, banana, café, cana-de-açúcar, citrus, feijão, girassol, milho, soja, tomate. Foram realizadas entrevistas com trabalhadores rurais e horticultores. A partir dos dados, foram elaborados indicadores compostos para a proposição de uma escala de autossuficiência alimentar nos territórios estudados. Os resultados apontam para desigualdades na ocupação dos territórios, dependência de alimentos de outras regiões e aumento do uso de agrotóxicos como consequência do modelo de produção adotado, afetando a produção local de alimentos.

PALAVRAS-CHAVE Produção de alimentos. Abastecimento de alimentos. Saúde ambiental.

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Introduction

The agricultural productive dynamics of a space interferes with the social organization of the territory, especially in relation to the production of food for local supply or export. These issues are directly related to the economy, government policy and the inclusion or not of people's participation in the control of food systems. The term food sovereignty is defined as the right of nations and peoples to control their own food systems, their own markets, the choice of productive models, cultures and food environments¹, while the concept of food and nutrition security encompasses the realization of the right from everyone to permanent access to quality food, in sufficient quantity, without compromising access to other essential needs, based on health-promoting food practices that respect cultural diversity and that are socially, economically and environmentally sustainable².

The complementarity between the concepts is expressed by the ways of producing and obtaining food with local dynamics and repercussions. In this sense, the concept of food self-sufficiency discussed here implies the ability to produce food for local and regional supply, respecting the adoption of alternative production models to the hegemonic of agribusiness, so that global economic interests do not overlap with local supply needs, environmental protection and people's health.

The promotion of food sovereignty in a territory requires the guarantee of access to land and the conditions necessary to strengthen family production and local markets. According to the National Food and Nutritional Security Plan 2016-2019, the promotion of family farming guarantees the reduction of poverty and inequality in rural areas, greater diversification in food production, the strengthening of food supply in distant locations and the consequent dynamization of local economies³.

Food Insecurity Studies based on indicators such as Ebia (Brazilian Household Food Insecurity Measurement Scale) have been carried out in Brazil since its validation, in 2003, and later inclusion in the National Household Sample Survey (PNAD)/Brazilian Institute of Geography and Statistics (IBGE) 2004, being considered an instrument for generating a direct indicator of household food security measures⁴. Although this measure is an important indicator, it is understood that the food security of a territory goes beyond guaranteeing access to food, but it includes equity in the use of territories and the definition of production models, seeking to guarantee social justice and health promotion.

Contrary to this perspective, agribusiness represents a strategy for the expansion of agro-industrial capital, which has consolidated itself as a hegemonic model from a discourse of expansion of world food production in the post-war period, especially from the 1950s, with the so-called Green Revolution, whose bases of support imposed the modernization and technification of agriculture to the countryside⁵. This production model follows the trends of food standardization and homogenization and meets the consumption profiles of postmodern society⁶, which is based on ultra-processing of food, obtaining proteins of animal origin and fuels.

Brazil is currently one of the world's largest exporters of commodities and keeps its economy dependent on this productive model⁷, which has consequences for the overexploitation of natural resources and labor⁸, concentrates land and capital⁹, makes peasant and traditional populations vulnerable by the process of 'pressure' and 'expulsion' from their lands^{5,8}, has consequences for people's health^{10,11} and food sovereignty in the territories^{12,13}. On the other hand, the food that supplies urban populations comes, in large part, from family production, whose potential for polycultural

production, organic and agroecological production lacks public policies for incentives and subsidies^{13,14}.

The state of Mato Grosso has in recent decades become a strategic region for the expansion of agribusiness with the use of extensive areas for the production of monocultures on the savannah biome. Mato Grosso has large productive regions of crops¹⁵, among which stand out the municipalities of Campos de Julio, Sapezal and Campo Novo do Parecis, which make up the Juruena River Basin, in whose territory areas of monocultures, Indigenous Lands and important rivers coexist that will compose the Amazon River Basin. Due to their flat ground and mild climate, these lands have been used intensively for mechanized agriculture and the production of agricultural commodities, to the detriment of food production.

This article aims to present and discuss a composite indicator of self-sufficiency assessment in food production in interface with the implications of the agribusiness production model from the perspective of food sovereignty in the territories, based on a case study conducted in three municipalities of the Juruena River Basin, in Mato Grosso. It is understood that the hegemonic occupation of a productive model whose main objective is the production of commodities for export concentrates and centralizes capital, compromising the production and reproduction spaces of family farmers, making it difficult for local consumers to access food produced without use of chemical inputs.

The analysis of local indicators of food self-sufficiency makes it possible to highlight the occupation of the territory destined for local and regional production, contributing to a broader analysis of food security and its interface with health promotion. It is not a matter of discussing only the access and availability of food, but the production and local supply strategies that

characterize this access in a democratic and environmentally sustainable way, respecting the autonomy of the peoples in defining their food systems, as well as expanding safe access to food, one of the pillars of the human right to adequate food and health promotion.

Methods

This is an evaluative case study that integrates qualitative research techniques and analysis of secondary data on production and occupation of the territory to compose a matrix of indicators, from which an indicator composed of self-sufficiency for food sovereignty was established, carried out in the municipalities of Campos de Júlio, Campo Novo do Parecis and Sapezal, located in the West region of the state of Mato Grosso.

Interviews

Interviews were conducted with 05 rural workers and 02 horticulturists, contacted by the Rural Workers Union in Campo Novo dos Parecis; 20 rural workers and 02 horticulturists in Campos de Júlio; and 05 horticulturists in Sapezal, totaling 34 interviews. The interviews took place between the years 2015 and 2016, transcribed and analyzed from the perspective of 'Content Analysis'¹⁶. Among the interviewees that make up the 'rural worker' category, 20 are settled workers (80%) and 05 are formally employed on farms in the region (20%). Among the horticulturists interviewed, all are owners of land located around the urban area of cities. The average age group was 42 years old, the majority (85%) being male.

The interview script was composed of the following questions: Mr./Mrs., do you produce here on this property? Which foods?; Mr./Mrs., are you linked to any social movement involved in the struggle for land or a union?; Mr./Mrs., do you sell your

products at fairs, public markets, stands, supermarkets in the municipality/region? How is commercialization done?; Mr./Mrs., do you sell your products to institutions? Which are? Through which programs?; In your opinion, what are the difficulties in food production here in the region? And what are the positive points?; Mr./Mrs., do you know where the food that supplies the municipality comes from?; What are your suggestions for improving food production in the municipality/region?

Following the steps proposed by Bardin, transcription, pre-analysis and exploration of the material began; data processing, interpretation and inferences¹⁶. From the reading of the interviews, the following categories of analysis were identified: Difficulties in Food Production for consumption and local/regional marketing; Marketing difficulties in local/regional markets; Dependence on food produced in other regions for local supply; Inequities in the Occupation of territories. The production sites were also identified, characterized as 'production for local/regional supply' and 'production of agricultural commodities' in the municipalities.

Agricultural production and use of pesticides

To carry out the production survey, it was used as a base the data of area planted by cultivation obtained by Municipal Agricultural Productivity (PAM) from the database of the IBGE Automatic Recovery System (Cider) for the year 2016¹⁷. Informations were obtained about the cultivated area of cotton, rice, banana, coffee, sugar cane, citrus, beans,

sunflower, corn, soybeans, tomatoes. These cultures were chosen because they represent the predominant profile of production in the state and for the purpose of comparison with the foods most frequently consumed in the national diet¹⁸.

The locations destined for local/regional production that denominate the production and/or direct sale to the consumer spaces, such as vegetable gardens, fairs, dairy products, fishing, among others, were informed during the interviews. The data on the use of pesticides were estimated according to the methodology proposed by Pignati et al.¹⁹, based on the area cultivated for each product and the average use of pesticides per agricultural crop.

Construction of indicators

The data represent empirically observable reality events and perceptions of social actors about this reality, and are the raw material for the production of indicators, whose objective is to structure systems for monitoring a given environmental and food situation with surveillance over determinants and conditions exposure of populations to health risks²⁰. Despite their importance, the indicators do not cover the whole of reality, but allow the identification of priority areas, the monitoring of risk situations and the comparison between different territories, subsidizing decision making.

From the collected data, indicators, their respective reference values and a scale for the analysis of food self-sufficiency were proposed, from the perspective of food sovereignty, as shown in *chart 1*:

Chart 1. Indicators proposed for the analysis of food self-sufficiency in agribusiness territories in MT

Indicator	Formula	Source	Reference Values	Scale
% territory destined for the production of commodities (soy, cotton, sugarcane, sunflower)	Cultivated area in hectares/ total production area of the municipality x 100	IBGE-Sidra Municipal Agricultural Production Data	0 - 25%	1
			25% - 75%	2
			75% - 100%	3
% territory for the production of food (rice, beans, coffee, tomatoes, pine-apples, bananas, citrus)	Cultivated area in hectares/ total production area of the municipality x 100	IBGE-Sidra Municipal Agricultural Production Data	0 - 25%	3
			25% - 75%	2
			75% - 100%	1
Presence of production spaces and/or direct sale of food to the consumer	Presence of fairs, vegetable gardens, fisheries, dairy products, farms, sausages, orchards	Interviews and data from the Agricultural Defense Institute of Mato Grosso (Indea-MT)	- Presence of at least 02 items;	1
			- Presence of vegetable gardens only;	2
			- Absence	3
Pesticide use per year	Pesticide consumption estimate proposed by Pignati et al., 2017, based on data from Indea-MT	Volume of pesticides used per year (liters)	Between 100 liters and 1,999,999 liters	1
			Entre 2,000,000 and 5,000,000 liters	2
			Above 5,000,000 liters	3
Perception of rural Workers on local/regional food production	- Difficulty in Local/Regional Food Production	Categories raised in interviews with rural workers and small producers (horticulturists)	No	0
			Yes	1
			No	0
	- Inequities in the Occupation of territories;	- Dependence on food produced in other regions	Yes	1
			No	0
			Yes	1

Source: Own elaboration based on data from Municipal Agricultural Production IBGE/Sidra¹⁷; Pignati et al. 2017¹⁹ and in the interviews.

The purpose of the scale is to analyze the occupation of the territory in relation to local production and production of commodities. Based on the sum of the reference values equivalent to each indicator analyzed, the following scores were used:

- 1 to 5 points: The production of commodities and food occurs concurrently;

- 5 to 10 points: Local/regional food production is restricted;

- 10 to 15 points: Local/regional food production is rendered infeasible by the production of commodities, affecting the food sovereignty of the territory.

Excel 2010 software was used for the preparation of tables, and ArcGis 10.1, by Esri, for drawing up maps.

The research was submitted to the Ethics

Committee for research involving human beings at the Júlio Muller University Hospital, having been approved on 02/08/2015, under opinion n° 951.083.

Results

Based on some indicators considered sentinel to analyze the territory, a reference scale was built, based on production data, the use of pesticides and the categorization of interviews conducted in the municipalities.

The data available in *table 1* indicate that production in the municipalities studied is concentrated on agricultural commodities (soybeans, cotton, sugar cane, corn and

sunflower), to the detriment of more frequent agricultural products in the national

diet, such as rice, beans, coffee, bananas and tomatoes.

Table 1. Area for Municipal Agricultural Production per hectare of main crops

Category	Crop (ha)	C. N. Parecis (A)	Campos de Julio (B)	Sapezal (C)	Total in the region (A+B+C)	Mato Grosso	Cultivated area/crop in the region in relation to MT (%)
Commodities	Cotton	48,581	27,496	128,469	204,546	606,314	33.70
	Sugarcane	34,661	9,100	0	43,761	280,191	15.60
	Sunflower	15,830	860	1,985	18,675	29,122	64
	Corn	146,800	129,036	153,000	428,836	3,900,268	11
	Soy	380,000	186,079	368,368	934,447	9,147,863	10
	%	98%	97%	99%	98%	97%	---
Grains*	Rice	0	810	0	810	174,263	0.46
	Coffee	0	0	0	0	16,293	0
	Bean	13,440	9,768	8,250	31,458	251,672	12.50
	%	2%	3%	1,2%	2%	3%	---
Vegetables and Fruits**	Abacaxi	1	0	0	1	1,449	0.07
	Banana	0	0	0	0	6,967	0
	Citrus	0	0	0	0	937	0
	Tomate	0	0	0	0	243	0
	%	0	0	0	0	0,07%	---
Totais		639,313	363,149	660,072	1,662,534	14,418,300	11.50

Source: IBGE/Sidra, 2016¹⁷.

* Cereals, leguminous plants and other agricultural products for the production of processed foods, animal feed, fuels and other purposes.

** Cereals, leguminous plants, vegetables and fruits that directly compose the Brazilian diet, according to IBGE.

The region provides about 98% of its territory for the production of agricultural commodities and 2% of the territory for the production of food, following the tendency of the state of Mato Grosso to reprimand the economy. In 2016, Mato Grosso produced 27% of Brazilian soy, on 9,1 million hectares; 24% of corn in 3,9 million hectares; 63.5% of cotton in 606 thousand hectares; 2.5% of sugar cane in 280 thousand hectares; 54% of Sunflower in 29 thousand hectares; and 20 million hectares of pasture, with 30 million cattle^{15,17}.

According to data from the 2006 Agricultural Census¹⁵, the majority of rural establishments in the region belong to large individual owners and consortia of agricultural

groups, an average of 95% of the areas destined to the production of the municipalities, when compared to settlers, occupants and partners, expressing the concentration of large estates. Therefore, local food production is carried out by small landowners who have lands around the municipalities or in the urban area for planting gardens or producing fish. In general, the vegetable gardens are located in the central region of the urban areas of the municipalities due to the distance from the crops, which allows the production of vegetables.

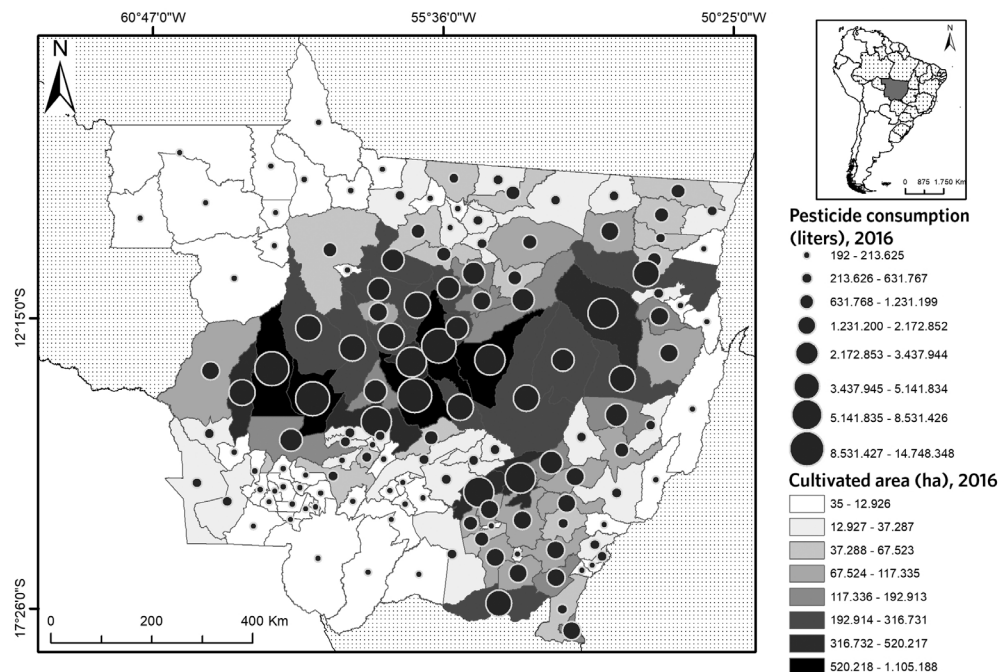
The comparison between the 2006 agricultural censuses¹⁵ and the preliminary data from the 2017 Census²¹ illustrates this situation from the 5% increase in the cultivated area

in hectares, despite the 2% reduction in the number of rural establishments, with emphasis on the increase in establishments with 1000 hectares above, whose relative participation in the total area went from 45% to 47.5% from 2006 to 2017, and reduction of establishments between 100 and 1000 hectares with a decrease

in the relative participation in the total area from 33.8% to 32%, which indicates the concentration of land for agricultural groups at the expense of small and medium producers.

The municipalities are among those with the largest cultivated area in MT, as shown in *figure 1*.

Figure 1. Map of cultivated area and use of pesticides in Mato Grosso, 2016



Source : IBGE/Sidra, 2016¹⁷; Pignati et al., 2017¹⁹, updated by the authors.

For each hectare cultivated in the region, an average of 10 to 20 liters of pesticides are used, which places these municipalities among the largest consumers of pesticides in the state. Considering the production profile of the municipalities, these values increase according to the crop cultivated, since, for cotton crops, an average of 28 liters per hectare is used, and for soybeans, 17,7 liters of pesticides per hectare¹⁹.

In periods of aerial spraying of pesticides close to the urban area of the municipalities,

the production of vegetables is reached and impacted, causing production loss. This situation was reported by respondents in the three municipalities studied. Pignati, Machado and Cabral²² analyzed 'the rain of pesticides' over the municipality of Lucas do Rio Verde/MT, in the perspective of an expanded rural accident. The use of agricultural tractors and airplanes for spraying results in the drift of pesticide mists, which, in addition to reaching the target (plants and pests), also affect workers and,

indirectly, air/soil/water, residents, the animals and other plants that are around the ‘treated areas’²².

Among the food insecurity factors listed in the interviews, the categories identified were: difficulties in local food production and marketing; inequities in the occupation of territories; dependence on food produced in other regions. The reports point to the concern with the production profile of the municipalities and the absence of ‘political will’, manifested in the conduct of policies to strengthen family farming, in addition to the pressure to obtain ‘technological packages’, that end up leading the producer to opt for the production of commodities.

The predominance of monoculture crops in the areas surrounding the municipalities makes family/community and polycultural production difficult due to several factors, among them, the difficulty of obtaining land and the spraying of pesticides, which generate environmental contamination, restricting and even preventing food production. This fact highlights the inequalities in access and use of land and the dependence on foreign markets to promote the supply of cities.

The reports also indicate the low availability of food from local production, such as fruits, vegetables, chicken, pork and milk,

and the absence of spaces for the commercialization or processing of food from family farming in the region, making it difficult, including the fulfillment of the marketing mechanisms of the PAA (Food Acquisition Program), which favor the direct purchase of products from family farmers or their organizations to provide, among others, the supply of the school network, as recommended by the National School Feeding Program (PNAE)²³.

The dependence on food from other states is also pointed out as a weakness, due to the reduced diversity in the supply of food, high prices and lack of knowledge about the origin and tracking of foods that supply the municipalities. Contrary to the inexpressive occupation of the territory, with spaces for the production and sale of food, many enterprises in the agribusiness chain are installed in the municipalities, with emphasis on cotton plants, soy processing units, silos, sugar and alcohol production plants and corn ethanol production plants, whose investments have been expanded in municipalities in Mato Grosso.

The scale of indicators, available in *table 2*, points to a scenario of uneven occupation of the production territories of the municipalities.

Table 2. Scale of indicators for the analysis of land use from the perspective of food sovereignty

Municipalities	Area for the production of Commodities (A)		Area for the production of Foods (B)		Spaces Production and/or direct sales to consumers (C)	Volume of pesticides used (D)	Perception of rural workers regarding local food production (E)	Total* (A+B+C +D+E)
	%	Reference value	%	Reference value	Reference value	Reference value	Reference value	
Campos de Júlio	97	3	3	3	1	2	1	10
Campo Novo dos Parecis	98	3	2	3	1	2	2	11
Sapezal	99	3	1.2	3	2	3	3	14

Source: Own elaboration.

*1 to 5 points: Commodities and food production occurs concomitantly; 6 to 10 points: Local/regional food production is restricted; 11 to 15 points: Local/regional food production is rendered unfeasible by the production of commodities, affecting the food sovereignty of the territory.

The municipalities of Campo Novo dos Parecis and Sapezal had a score of 11 and 14, respectively, indicating that when occupying the production territories in these municipalities, local/regional food production is rendered unfeasible by the production of commodities, affecting the food sovereignty of the territory. Among the municipalities studied, only Sapezal has municipal food and nutrition security legislation, but it does not have a Municipal Council and Municipal Food and Nutritional Security Plan.

The municipality of Campos de Júlio has a larger area for the production of food and spaces for direct sale, despite the concurrence with large areas of production of commodities. Even so, it is observed that the municipality has restrictions on local food production, due to the hegemonic occupation of production territories by monocultures of agricultural commodities.

Such an occupation expresses the difficulties of defining the food systems themselves. They also reflect the intensive and uneven use of land for monocultures, whose impacts of the productive model, such as the intensive use of pesticides and chemical fertilizers, compromise local production, affecting food sovereignty in the region.

Discussions

Among the characteristics of the concept of food sovereignty, the production profile represents an important category of analysis, through which it is possible to identify the hegemony of the monocultural model and of the entire agribusiness chain in the municipalities studied, highlighting the option for the reprimarization of the export agriculture²⁴ and dependence on products from other states for domestic supply.

The three municipalities are among the 50 cities with the largest Gross Domestic Product (GDP) related to agribusiness at the national level, where Sapezal occupies

the 5th place, with R\$ 845,9 million, Campo Novo dos Parecis the 6th place, with R\$ 811,3 million, and Campos de Júlio in 40th place, with R\$ 433,2 million reais, in relation to the gross added values of Farming²⁵. Despite this, there is a concentration of income and the coexistence of wealth and situations of social vulnerability, even among those who work directly in agribusiness. This concentrated wealth does not remain in the territory, since the production of commodities is predominantly export-oriented and most of the companies that make up the agribusiness chain do represent foreign capital²⁶.

The option of not taxing primary products for export contributes to the definition of the territory for large-scale production of agricultural commodities for export, supported by Complementary Law n° 87, of September 13, 1996 – Kandir Law²⁷, which ensures the exemption from the Tax on Circulation of Goods Services (ICMS) for semi-finished primary and industrialized products and services for export. Such condition makes the supply of public policies in the state of Mato Grosso vulnerable, with important repercussions on the health sector, since the state fails to collect taxes arising from these exemptions.

According to Acserald²⁸, the change in the role of the State as an inducer of the development of peripheral regions to foster the primary export economy contributed to dismantle spaces and to the emergence of tensions in the federative pact. In addition to the social and environmental burden resulting from the production process, which remain in these territories as an ‘environmental liability’, the negative effects on health systems are observed by the insufficiency of structural investments in the studied regions.

For Breilh, the concept of accumulation by plunder, despite the added value, currently expands from two phenomena: the growing technological characteristic of the information society and the change in the model of capital accumulation⁸, which lead to a domination profile of the least developed countries, their

peoples and territories. Still, according to the author, plundering determines processes of agricultural transnationalization, monopolization of land, loss of sovereignty, degradation of the countryside, loss of human and environmental rights and conversion of rights and natural resources into goods⁸.

The perception of local production, its singular and particular aspects, and the evidence of a dependence marked by instabilities in the financial market, commodities production capacities and environmental pressures in the territories are perceived in the statements, which, on the one hand, recognize that this productive model brings greater income, but also brings consequences and risks, protective and destructive factors²⁹, through exposure to the risks of contamination during planting times, pesticide spraying and harvesting. At the same time, they feel the imposition of dependence on work and income, the difficulties of local production, affecting social reproduction and ways of life.

Despite the differences that exist between the different agents, they have certain experiences in common, such as, for example, subordination to the distant market³⁰, which is expressed both in the commercialization of locally produced commodities and in the dependence of food from other states to supply the region, characteristics of the process of deterritorialization of production and ways of life. In this sense, the study of food systems in the occupation of agricultural production spaces can contribute to the promotion of healthy and sustainable territories.

Seufert, Ramankutty and Foley³¹, in a meta-analysis of conventional and organic systems in different countries with specific climate and management conditions, conclude that the yields and benefits of family systems of organic production improve as they are encouraged by research, development of techniques and production and distribution technologies in local and regional circuits, with real impacts on improving the environments and the health of the populations. Such

evidence was also presented by Reganold and Wachter³², who analyzed the performance of family farming in the light of four main metrics of sustainability: productivity, environmental impact, economic viability and social well-being, and concluded that, despite producing lower yields, organic family farming tends to be more profitable from an economic point of view, as it allows for equitable income distribution, is sustainable, produces more nutritious food in terms of nutritional composition and without chemical residues, offers more ecosystem services and social benefits, in comparison with conventional agricultural production systems. The authors also state that local production and supply systems based on organic agriculture and other innovative forms of production have the potential to supply a greater number of people and require investments in public policies to promote their development and implementation.

Nigli³³ states that the biggest challenge for agriculture is to reduce the trade-offs between productivity and long-term sustainability, with local family and organic production systems being the ways to produce and distribute food that have the potential to guarantee the future of sustainable food production. The same was reaffirmed by Pradhan et al.³⁴, who evaluated the productivity of production systems that used intercropping and crop coverage with conventional monoculture systems for 03 years, concluding that, in the long run, sustainable agriculture has the potential to recover soils and water, promoting greater nutrient retention in food and equivalent and higher productivity than conventional production systems.

A study carried out by Alencar et al.³⁵, evaluating conventional agricultural systems and organic family production, showed that the farmer-environment interactions, in the family production system, improved the quality of life of the families, in contrast to the conventional system, characterized due to the intensive

use of pesticides and the great dependence on chemical fertilizers, where interest in obtaining maximum production prevails without concern for the environment. This condition is reflected in the continuous contact with pesticides, restrictive profit margins and a reduction in the natural fertility of soils cultivated under this system.

With regard to local food production and distribution circuits, Darolt et al.³⁶ analyzed alternative networks in Brazil and France. As a result, they presented a typology, characteristics and organization of short marketing channels, emphasizing that alternative systems are diverse and dynamic, being a social, economic and environmental option for family farming, strengthening local markets and reconnecting producers and consumers. In both countries, successful initiatives in alternative systems take place in areas where there are forms of network coordination and partnerships between public authorities, non-governmental entities, companies, farmers' and consumer organizations³⁶.

On the other hand, the monopolization of the territory is a strategy developed by the commercialization and/or industrial processing companies of agricultural production, which do not necessarily produce, but control the circulation of goods in the globalized economy³⁰, that is, they monopolize production, having no need to territorialize monopolies³⁷, controlling the processing and marketing of goods. This is the case of large corporations of pesticides, fertilizers and machinery, production and marketing of transgenic seeds and patent control and Tradings, responsible for trading commodities in international markets. These companies operate in the so-called commodities origination strategies, allying themselves with national companies in the exploration of production territories. National capitalists, then, have the status of landowners, but the exploitation of industrial capital, via commodities, is international³⁷.

The legitimation strategies of this model find a voice in the discourses of local and regional economic development, but they support a limited number of transnational companies that monopolize the circulation of goods, dictate the economic rules of the markets and influence eating habits and practices, through a homogenization and typification process of the consumption of fast, ultra-processed, highly industrialized foods or contaminated with pesticide residues.

Final considerations

Discussions about a productive model and its repercussions in a territory such as the Juruena River Basin permeate the dominant occupation by monocultures and structures related to the agribusiness production chain, to the detriment of spaces intended for food production and polyculture family farming, and express a phenomenon evident in much of the Brazilian territory.

Despite high GDP rates and large tracts of lands destined for agriculture, the concentration of income and land is an evident phenomenon in the region and reflects the national reality. The study of the territory contributes to the discussion about health surveillance from the perspective of developmental surveillance. The agribusiness production and reproduction model and its accumulation processes have an impact on the ways of obtaining and consuming them, on the health of the exposed populations, on the progressive environmental destruction of environments, water and food. On the other hand, the promotion of spaces for agroecological family production and the encouragement of local and regional marketing circuits enhance local economies, promote greater availability of healthy food in cities, reducing the dependence on food produced elsewhere, and contribute positively for the sustainability and health of the territories. Thus, it is important to guarantee family farmers access to land, the choice of the

productive model, as well as the conditions of production and marketing of their products.

The proposed indicator shows internal variations in the indices in the three municipalities, showing a trend of greater impact, as the production of agricultural commodities increases. However, the study has limitations as it highlights the reality of a specific agricultural territory, requiring further studies in different regions of agricultural production, in addition to the inclusion of indicators such as contamination of drinking water, food with pesticide residues and the evaluation of implementation of health surveillance for populations exposed to pesticides in the municipalities.

Thus, it is considered that the metric presented shows and measures the threat of a reduction in the availability of healthy food for human consumption in a given territory, since the negative pressure on food sovereignty

exerted by the extension of production areas aimed at monocultures was evidenced by the proposed index.

Collaborators

Montanari-Corrêa ML (0000-0001-7812-0182)* and Pignati WA (0000-0001-9178-6843)* also participated in all stages of the elaboration of the article: study design, collection, organization, interpretation and analysis of the data and writing. Pignatti MG (0000-0001-7942-3847)* and Machado JMH (0000-0002-1176-1919)* participated in the interpretation, data discussion and critical review of the article. Lima FANS (0000-0001-5677-2390)* participated in data collection, analysis, interpretation and discussion. All authors approved the final version of the manuscript. ■

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